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Guidelines for Policies on Heat-Related Illness Prevention In Student-Athletes

INTRODUCTION

Pursuant to Senate Bill [161](#) (2022), the Department of Education (Department) is directed to develop and distribute to school divisions guidelines on policies to inform and educate coaches, student-athletes, and student-athletes' parents or guardians on the nature and risk of heat-related illness.

CODE OF VIRGINIA CHAPTER 428

An Act to direct the Department of Education, in conjunction with stakeholders, to develop guidelines on policies to inform and educate coaches and student athletes and their parents or guardians on heat-related illness to be distributed by August 1, 2022.

[S 161]

Approved April 11, 2022

“Be it enacted by the General Assembly of Virginia:

1. *§ 1. The Department of Education shall, in conjunction with relevant stakeholders, including the Virginia High School League, the Department of Health, the Virginia Athletic Trainers' Association, representatives of the Children's Hospital of the King's Daughters and the Children's National Medical Center, the Virginia Chapter of the American Academy of Pediatrics, the Virginia College of Emergency Physicians, the Virginia Academy of Family Physicians, the Medical Society of Virginia, and the Virginia Association of School Nurses, develop guidelines on policies to inform and educate coaches and student athletes and their parents or guardians of the nature and risk of heat-related illness, how to recognize the signs of heat-related illness, and how to prevent heat-related illness. The guidelines shall be distributed to local school divisions by August 1, 2022.”*

As a result, the Department is providing policies and procedures on how to prevent heat-related illness, how to recognize the signs of heat-related illness, and how to manage any heat-related illness which may occur, along with the terminology, definitions, and resources to further support and educate coaches, student-athletes, and student-athletes' parents or guardians.

BACKGROUND

Conditions

“Heat-related illness” is a general term encompassing four specific conditions: (1) heat stroke (a medical emergency); (2) heat exhaustion; (3) heat syncope (fainting); and (4) heat cramps. The prevention of heat-related illness includes proper acclimatization for exercise in hot and humid environments and maintaining appropriate hydration levels.

“Heat acclimatization” involves gradual increases in the duration and intensity of physical activity in hot and humid environments over a 7-14 day period. Appropriate hydration begins prior to engaging in exercise, followed by minimizing fluid loss during activity and replacing fluid after activity.

Additionally, local monitoring of ambient temperature and humidity levels, combined with policies that limit practice duration, activity intensity, and the wearing of protective equipment during periods of high temperature and humidity levels, is critical to preventing heat-related illness and promoting student-athlete health and safety.

Student-Athletes

Student-athletes displaying the following signs and symptoms may be experiencing heat stroke and heat exhaustion, the two most concerning forms of heat-related illness, and should be removed from play immediately:

- Irrational behavior, irritability, or emotional instability
- Altered consciousness
- Excessive fatigue
- Disorientation
- Dizziness
- Headache
- Confusion
- Nausea or vomiting
- Diarrhea
- Collapse
- Staggering or sluggish feeling

Coaches, Athletic Trainers, and Other Staff

Coaches, athletic trainers, and other staff supervising the activity should be monitoring student-athletes for any signs or symptoms of heat-related illness. Coaches, athletic trainers and other staff should be prepared to remove from activity immediately any student-athlete reporting or displaying any signs or symptoms of heat-related illness and to rapidly cool the student-athlete with whole-body by:

- Cold-water immersion, which is essential when heat stroke is suspected;
- Dousing the student-athlete with cold water (cold shower);
- Rotating ice towels and/or ice bags over as much of the body of the student-athlete as possible; and/or
- Using fans to cool the student-athlete

Establishing effective management protocols and a dedicated Emergency Action Plan (EAP) for all athletic settings are the most effective strategies for helping reduce the incidence of catastrophic outcomes resulting from heat-related illness.

DEFINITIONS

Heat-related illness is a general term describing a number of medical conditions associated with dehydration, poor acclimatization, and exposure to or prolonged exercise in hot and humid environments.

Heat acclimatization describes a complex series of changes occurring within the body in response to heat stress over a period of one to two weeks. Adaptations in heat tolerance that come from gradually increasing the intensity or duration of work performed in hot settings allow the body to better cope with activity in hot and humid environments.

Heat cramps are a type of exercise-related muscle cramps characterized by painful cramping usually occurring in the arms and legs. Heat cramps may be caused by exercising in hot or humid environments, dehydration, or excess sodium and electrolyte loss commonly associated with exercise in those environments. While not a medical emergency, heat cramps may be confused with a more serious condition, exertional sickling.

Heat exhaustion is the body's response to an excessive loss of water and salt, usually through excessive sweating.

Heat stroke is the most serious heat-related illness. It occurs when the body can no longer control its temperature, the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Heat stroke can cause permanent disability or death if the person does not receive emergency treatment.

Heat syncope refers to fainting (syncope) episodes experienced by individuals exercising in hot and humid environments and results from a temporary decrease in blood flow to the brain causing a brief loss of consciousness. Factors that contribute to heat syncope include dehydration and lack of acclimatization.

While not a heat-related illness, **exertional sickling** is associated with intensive exercise in hot and/or humid conditions, particularly with individuals who may be poorly acclimatized or deconditioned and may be confused with heat cramps. Exertional sickling is a medical emergency in which the red blood cells of a person carrying the sickle cell trait change shape (sickle) leading to decreased blood flow. This decrease in blood flow can lead to a breakdown of muscle tissue and cell death, a condition known as fulminant rhabdomyolysis.

VIRGINIA DEPARTMENT OF EDUCATION GUIDELINES

1. Policies and Procedures

- a. Each school division shall develop and biennially update policies and procedures regarding prevention, recognition, and management of student-athletes who may be experiencing heat-related illness.
- b. Heat-related illness prevention education programs may include:

- Risk factors associated with heat-related illness.
 - Common signs and symptoms of a heat-related illness include heat stroke, heat exhaustion, heat syncope, and heat cramps.
 - Early recognition of a student-athlete displaying signs and symptoms of a heat-related illness and prompt response is critical.
 - Encouragement of immediate reporting by student-athletes experiencing signs and symptoms of a heat-related illness.
 - A failure to do so may delay the medical evaluation of the student-athlete, the determination of the cause of any signs or symptoms, and medical intervention to stabilize the student-athlete.
 - Student-athletes who continue to play while experiencing potential signs or symptoms of a heat-related illness are at risk of experiencing a medical emergency.
- c. School staff supervising athletic activities in hot and humid environments should be monitoring student-athletes for any signs or symptoms of heat-related illness and should be prepared to immediately cool a student-athlete suspected of heat exhaustion or heat stroke with whole-body cold-water immersion, cold water dousing (cold shower), ice towels and/or ice bags, and/or the use of fans.
- d. A student-athlete reporting signs or symptoms associated with a heat-related illness to a coach, athletic trainer, or team physician in a practice or game shall be removed from the activity at that time. A student-athlete who has been removed from play, evaluated, and suspected to be at risk of or experiencing heat stroke shall not return to play that same day.

2. Recognition

Each school division will ensure school staff have training in the recognition of the signs and symptoms of heat-related illnesses.

Heat-related illnesses are not part of a continuum in the sense that an individual experiencing heat exhaustion who continues to exercise will in turn develop heat stroke. While some of the signs and symptoms are similar, these are unique conditions. That said, experiencing heat cramps or syncope one day might predispose an individual to more significant heat-related illnesses in the future.

The following signs and symptoms of heat-related illness are adapted from guidance provided by the Korey Stringer Institute (ksi.uconn.edu). For additional information, please see the Resources section of this document.

a. *Heat stroke*

- Rectal temperature greater than 105°F (40.5°C)
- Irrational behavior, irritability or emotional instability
- Altered consciousness

- Disorientation
- Dizziness
- Headache
- Confusion
- Nausea or vomiting
- Diarrhea
- Collapse
- Staggering or sluggish feeling

b. Heat exhaustion

- Fatigue
- Nausea
- Fainting
- Weakness
- Vomiting
- Dizziness/lightheadedness
- Pale
- Chills
- Diarrhea
- Irritability
- Headache

c. Heat syncope

- Dizziness/lightheadedness
- Weakness
- Loss of consciousness
- Tunnel vision

d. Heat cramps

- Dehydration
- Fatigue
- Painful, involuntary muscle spasms

e. Differentiating heat cramps and exertional sickling

- While both conditions present with pain, the pain associated with cramping usually occurs in a specific area while the pain associated with exertional sickling is more generalized.
- Cramping muscles appear tight and will “lock-up” limiting function and leading individuals to stop activity. With exertional sickling, muscles become weak leading the individual to try to push through the experience.
- Cramping generally occurs during or after activity. Exertional sickling typically occurs within the first 30 minutes of an intense workout.

3. Prevention

Each school division will ensure that school staff have training of the risk factors associated with and the prevention of heat-related illnesses.

- a. Risk Factors for Heat Exhaustion:
 - Exercising in hot and humid environment (air temp > 91°F/33°C)
 - Inadequate fluid intake before or during exercise resulting in dehydration
 - Inappropriate work to rest ratios with too much work compared to rest breaks
 - Body mass index > 27 kg/m²

- b. Risk Factors for Heat Stroke:
 - Intrinsic Factors which may impact risk of heat stroke for student-athlete
 - History of heat-related illness
 - Inadequate heat acclimatization
 - Low overall fitness level
 - Overweight or obese
 - Inadequate hydration
 - Lack of sleep
 - Fever
 - Stomach illness
 - Highly motivated/ultra-competitive personality
 - Pre-pubescent individuals

 - Extrinsic Factors which may impact risk of heat stroke for student-athlete:
 - Intense or prolonged exercise with minimal breaks
 - Repeated/prolonged exposure to high temperature/humidity/sun
 - Elevated Wet Bulb Globe Temperature (WBGT)
 - Inappropriate work/rest ratios based on intensity
 - Wearing dark colored or heavy-weight clothing
 - Wearing protective equipment
 - Poor overall fitness
 - Peer or organizational pressure
 - Lack of education and awareness of heat illness risk factors among coaches, athletes, and medical staff
 - Absence of an emergency action plan (EAP) and/or policies and procedures to manage heat-related illness
 - No or limited access to fluids or breaks during practice
 - Delay in recognition of signs and symptoms associated with exertional heat stroke (EHS)

- c. Monitoring Ambient Temperature and Humidity:
 - As temperature and humidity increases, so does the stress placed upon the body while exercising in hot and humid environments, increasing the risk of developing a heat-related illness.
 - Assessing Wet Bulb Globe Temperature (WBGT) is a widely recommended method for assessing ambient temperature, humidity, wind,

and solar radiation during exercise. Schools are encouraged to develop policies that include regular monitoring of local conditions, ideally WBGT, and requirements to moderate or postpone athletic activities when temperature or humidity levels reach dangerous levels.

d. Prevention through Heat Acclimatization:

- Heat acclimatization describes the process of gradually increasing the duration and intensity of physical activities and exercise in hot and humid environments in order to increase the body's ability to cope with heat exposure.
- As heat acclimatization occurs over 7-14 days, schools should develop policies that limit practice duration, activity intensity, and the wearing of protective equipment during the early portion of an athletic season. The Virginia High School League Handbook includes Fall Practice Guidelines and additional resources to support schools in the development of effective heat acclimatization policies.

e. Prevention through Hydration:

- Maintaining appropriate hydration levels during exercise promotes participant safety and increases performance. Hydration level is influenced by a number of factors, including exercise intensity, duration, environmental conditions, and intake of fluids before, during, and after exercising.
- As a person becomes more dehydrated, performance deficits become noticeable as body temperature and heart rate increase which in turn increases the risk of developing a heat-related illness.

Student-athletes should strive to begin exercise properly hydrated while minimizing fluid loss during activity, followed by fluid replacement after activity. Additional guidance on maintaining appropriate hydration levels is available in the Resources section of this document.

4. Management

Each school division will ensure each school has staff trained in the management of heat-related illnesses, including the development of Emergency Action Plans.

Emergency Action Plans (EAPs)

- a. Schools and other organizations sponsoring athletic programs are encouraged to develop comprehensive Emergency Action Plans (EAPs) specific to the athletic environment. These valuable resources are intended to help staff prepare for a wide variety of emergency medical situations that may occur during athletic participation. Advanced planning can save valuable time when responding to an

emergency. The Virginia High School League has developed an EAP template to help schools develop this important planning tool.

- b. Individuals experiencing or suspected of experiencing a heat-related illness should be removed from activity immediately. Additional information and guidance is available from the Resources listed at the end of this document.
- c. The specific treatment and any return to activity requirements will depend on the condition.
 - *Heat cramps*
 - Remove from activity to a cool or shaded area.
 - Stretch and/or massage the affected area.
 - Provide water and/or a sports drink to replenish fluids.
 - The student-athlete can return to activity that same day once the cramps have subsided and following a period of rest and fluid replacement. The cramps may return if the fluids have not been adequately replaced.
 - *Heat syncope*
 - Remove from activity to a cool or shaded area.
 - Have the student-athlete sit or lie down at first indication of symptoms.
 - Monitor the student-athlete for signs or symptoms of another medical condition.
 - Elevate the student-athlete's legs.
 - Provide water and/or a sports drink to replenish fluids.
 - The student-athlete can return to activity following a period of rest, fluid replacement, and once symptoms have resolved and other medical conditions have been ruled out. Medical clearance is advised prior to returning to activity.
 - *Heat exhaustion*
 - Remove from activity to a cool or shaded area and remove excess clothing and/or protective equipment.
 - Cool the student-athlete by dousing with cold water (cold shower), by rotating ice towels and/or ice bags over as much of the body as possible, and/or using fans.
 - Monitor for changes in central nervous system function.
 - Elevate the student-athlete's legs.
 - Provide water and/or a sports drink to replenish fluids.
 - If central nervous system changes develop or the student-athlete is slow to recover, suspect heat stroke and treat accordingly.
 - The student-athlete should rest and hydrate for at least 24-48 hours before returning to play. The return to play process should include

gradual increases in exercise intensity and duration. Medical clearance is strongly recommended.

- *Heat stroke*
 - Immediately remove all clothing and protective equipment as quickly as possible. If this proves challenging, avoid further delay by leaving clothing/equipment in place and proceed with rapid cooling.
 - Cool the student-athlete as quickly as possible using whole-body, cold-water immersion by placing the individual into a 35-58°F tub or tank filled with ice and water.
 - If whole-body cold-water immersion is not available, take the student-athlete to a cool or shaded area and cool by dousing with cold water (cold shower), rotating ice towels and/or ice bags over as much of the body as possible, and/or using fans.
 - Monitor and maintain an open airway, breathing, and circulation.
 - Once cooling has been initiated, activate EMS/call 911.
 - Continue to monitor vital signs and for central nervous system changes.
 - If rectal temperature is available, prior to transport, continue to cool until rectal temperature reaches 101-102°F.
 - A student-athlete experiencing heat stroke requires adequate time to rest, hydrate, as well as a formal medical evaluation prior to a return to activity.

RESOURCES

<https://www.vhsl.org/sports-medicine/heat-hydration/>

<https://nfhslearn.com/courses/heat-illness-prevention-2>

<https://ksi.uconn.edu/prevention/heat-acclimatization/>

<https://ksi.uconn.edu/prevention/hydration/>

<https://ksi.uconn.edu/prevention/emergency-action-plans/>

<https://ksi.uconn.edu/prevention/wet-bulb-globe-temperature-monitoring/>

Heat Stroke

<https://ksi.uconn.edu/emergency-conditions/heat-illnesses/exertional-heat-stroke/heat-stroke-prevention/>

<https://ksi.uconn.edu/emergency-conditions/heat-illnesses/exertional-heat-stroke/heat-stroke-risk-factors/>

<https://ksi.uconn.edu/emergency-conditions/heat-illnesses/exertional-heat-stroke/heat-stroke-recognition/>

<https://ksi.uconn.edu/emergency-conditions/heat-illnesses/exertional-heat-stroke/heat-stroke-treatment/>

Heat Exhaustion

<https://ksi.uconn.edu/emergency-conditions/heat-illnesses/heat-exhaustion/>

Heat Cramps

<https://ksi.uconn.edu/emergency-conditions/heat-illnesses/heat-cramps/>

Heat Syncope

<https://ksi.uconn.edu/emergency-conditions/heat-illnesses/heat-syncope/>